

**Liliana A. A. N. A. Truta, M. Goreti F. Sales. A disposable glass-based immunosensor for monitoring the cancer biomarker CEA in urine.** NanoPT 2014 International Conference, in Portugal, on February 12-14. Poster presentation based on topic Nanobio/Nanomedicine.

## **A disposable glass-based immunosensor for monitoring the cancer biomarker CEA in urine**

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### **Abstract**

Immunosensing is a fast and cost-effective method in clinical diagnosis, relying on antibody-antigen interaction for the quantitative detection a specific antigen. Different types of antigen species have been screened in this context, including tumor markers, assessed by enzyme-linked immunosorbent, chemiluminescence and electrochemical methods<sup>1</sup>.

Tumor markers are biomolecules in tumor cells or body fluids that may be associated with cancer diseases. Carcinoembryonic antigen (CEA) is among such markers, being employed in clinical diagnosis of over 80% colorectal cancers, with relatively little expression in normal mucosa<sup>2,3</sup>. Fast determination of CEA at low cost is presently required, to enable its use over wide screening programs and application in point-of-care context.

This work presents a new simple immunoassay method for CEA detection in urine using a disposable glass-based immunosensor coupled to electrochemical detection. Conductive glass covered by fluorine doped tin oxide (FTO) was used as conductive support and modified with anti-CEA by means of bottom-up approach. All stages involved in the biochemical modification were followed by electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV). The analytical performance of the device was fully characterized by EIS, proving sensitive readings of CEA from  $2.5 \times 10^{-3}$  to 0.10 ng/mL. The immunosensor was applied to real urine analysis from healthy individual spiked with the antigen. Overall, the combination of the sensory material with electrode design has lead to a promising tool for point-of-care applications, when applied to field monitoring of CEA in urine samples.

**Keywords:** Immunosensor; Carcinoembryonic antigen; Solid conductive support, Biological samples.

## References

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*Acknowledgements:* European Research Council is acknowledged for funding this work through the Starting Grant 3P's (GA 311086).